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ABSTRACT

The study investigated narrative schemata (abstract, prototypical memory frameworks containing the typical plot organizations for a story) with 17 hearing and 40 hearing impaired college students (poor and good readers). Subjects were asked to order statements into story order for three stories. Analysis of the stories in their original and edited forms was performed; differences between the experimental groups did not follow a similar pattern across the three stories. Findings suggested that grammatical features may actively foster different comprehension of narrative information. Although differences were shown between the poor and good deaf readers' subjective structures, these differences were minor and represented virtually identical notions of story structures. (CL)

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Grammatical Constraints on the Subjective Story Structures of Deaf and Hearing Readers

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Grammatical Constraints on the Subjective Story Structures
of Deaf and Hearing Readers

Typically, research on reading involving deaf subjects has focused on the pronounced achievement deficit (Trybus and Buchanan, 1971) or on the absence or misapplication of syntactic and lexical factors employed during reading (Quigley, et al., 1976; cf. Knight, 1979). Recent studies, however, have turned to facets of human memory to better describe differences in hearing and deaf readers. These efforts range from investigations of short-term memory recoding (Conrad, 1973; Conrad, 1979; Treiman and Hirsh-Pasek, 1983; Shand, 1982) to investigations of narrative schemata (Knight, 1982, 1983; Knight and Yekovich, 1981) in deaf and hearing readers.

The focus of this investigation is on the later area; that of narrative schemata. Narrative schemata are abstract, prototypical memory frameworks that contain the typcial plot organizations for a story (Thorndyke and Yekovich, 1980). Narrative schemata are presumably used to guide what the reader attends to, encodes, and is subsequently able to retrieve from memory when interacting with printed stories. It is assumed that these schemata evolve from the readers' accumulated experience both with the world, generally, and with stories, specifically (Mandler and Johnson, 1977).

Research has shown that deaf and hearing readers do not share the same subjective story structures. Knight (1982) and Knight and Yekovich (1981) showed differences in the configuration of narrative schemata between deaf and hearing undergraduates. These differences became more pronounced when subjects manipulated stories presented in scrambled order because subjects

were forced to call upon deeper notions of story to reconstruct narrative structure. Knight (1983) demonstrated that knowledge of a reader's narrative schemata predicted different recall of story information for deaf and hearing readers. Consequently, deaf readers, while utilizing narrative schemata in the reading process similar to hearing readers, may be comprehending story content differently due to their different subjective story structure.

However, it is unclear as to precisely what is causing these differences. While deaf readers certainly have different experiences with the world and with stories than do hearing readers, it is doubtful that experiential differences alone are totally responsible for the alternate story structures. Another obvious candidate to explain these differences would be the deaf and hearing readers' knowledge of the syntax of the language being read (in this case, English). That is, deaf readers, rather than having different notions of episodic structure and action sequences common to narratives, respond differently to syntactic information contained in the story propositions. Thus, it is the different interpretation of syntactic markers rather than a different notion of story that causes different subjective story structures to obtain between deaf and hearing readers.

One problem with resolving the syntax issue is that little information is available on the extent to which narrative schemata are constrained by syntax. While grammarians would undoubtedly argue that subjective notions of story are highly constrained by grammatical considerations, story grammarians would argue that common notions of episodic structure and story cohesion predominate (cf. Glenn, 1978; Mandler and Johnson, 1977).

Another set of factors could conceivably be clouding the issue. Knight (1983) reported a subgroup of deaf subjects who produced subjective story structures similar to hearing subjective structures and a subgrcup of deaf subjects who produced deaf story versions. While hearing loss was eliminated as a causative factor it is possible that some memory factor related to reading achievement was responsible for the two subgroups of deaf readers. For example, one study has shown differences in the way good deaf readers and poor deaf readers recode information in short-term memory while reading (Jen-McDermott, 1984). Consequently, intra-group differences in reading achievement may manifest themselves in differences in subjective story structure.

One resolution of these issues would be to remove the most salient features cortained in story propositions that mark and sequence story constituents. While it is impossible to eliminate all synta (i.e., it is impossible to eliminate tense) the influence of the markers would be minimized by editing story propositions into simple declarative sentences. These edited story propositions could then be presented to good or poor deaf readers and to hearing readers, in scrambled order, to rearrange into cohesive stories and parse into cohesive story units. Both tasks would be necessary as information on story order does not represent how subjects organize memory for narrative information. Conversly, knowledge of how subjects cluster story information does not directly address their ability to reconstruct canonical story sequences. The stories derived from the edited propositions could then be compared with the canonical stories (parsed by story grammars) to determine the influence of removing the cohesive

features from them. These analyses would provide information both on the extent to which grammatical factors constrain narrative schemata and on the differences within subgroups of deaf readers and between deaf and hearing readers regarding utilization of grammatical knowledge in processing story information.

Method

Subjects

Deaf. All deaf subjects reported hearing losses of 80 dB or greater in the better ear, having English speaking hearing parents, and becoming deaf before age three. Two groups of deaf subjects provided data. One group of 23 deaf subjects was composed of upperclass undergraduates at Gallaudet College and the second group represented 17 preparatory students located at Gallaudet's Northwest Campus. The former group was designated as good deaf readers and the latter group was designated as poor deaf readers.[1] All deaf subjects were paid volunteers.

Hearing. The 17 hearing subjects were undergraduates at a local four year college. All hearing subjects came from homes in which English was the first language and were paid volunteers.

Materials

Three simple stories with well known structural properties were used in the study; namely, the Farmer, Boy and King stories (Mandler and Johnson, 1977). These stories were used in previous work pertaining to narrative schemata with hearing and deaf readers (cf. Knight, 1982). The stories had previously been edited so that each sentence represented only one proposition (story meaning unit). In addition, each sentence was

further edited so that it represented a simple declarative statement in the past tense (see Tables 3, 4, and 5). Pronominal reference across sentential boundaries was also eliminated by making the referent explicit (e.g. the little boy rather than him or he). Consequently, the connectives and other syntactic markers promoting story cohesion were eliminated but the semantic content of the propostions remained unaltered. For each story a list of propositions and a set of cards was prepared with each card containing one sentence. The sequence of sentences in both the list and the card packet were scrambled. These materials were then assembled into packets containing the three stories in list and card form, and were arrayed in counterbalanced order.

Procedure. Instructions were presented to subjects both in writing and through the air (orally to hearing subjects, in Pidgin Sign English (PSE) to deaf subjects). Subjects were informed that the sentence lists and sets of cards each contained statements that could be arranged into a story. The subjects were directed to first order the statements into what they felt was the best story order by numbering the listed propositions. This task was then physically demonstrated. Second, subjects were instructed to divide the story statements on the cards into clusters of statements that represented parts of the story (cohesive story units). The cluster task was to be completed using the following rules:

a. each sentence could be used only once.

b. sentences appearing next to one another in the story list did not necessarily have to be grouped together in the clusters.

c. some sentence groups could contain only one sentence.

d. subjects were free to make as many or as few groups as they wished, but they could not make only one group.

Subjects were then instructed to paperclip together the sentences (on the individual cards) making up a cluster. Examples of clustering were aslo physically demonstrated.

Results

Story Order Comparisons

The purpose of the first part of the experiment was to examine subjects' ability to re-create canonical sequence. A measure sensitive to canonical arrays of story propositions (and conceptually similar to "runs" measures, cf. Siegel, 1956) was devised by counting the number of propositions an individual placed in canonical order regardless of where they were placed in the overall story order (cf. Knight, 1982). That is, any sentences occurring in canonical sequence (e.g., 1, 2, 3) were counted regardless of whether they were included in serial position 1, 2, 3 or not. Thus, rank data 4, 5, 1, 2, 3 was counted 4 (4, 5; 2, 3) and 1, 2, 3, 4, 5 was counted as 5. These counts were then divided by the number of possible sentences to obtain the proportion of story sentences in canonical sequence (P_s). When the P_s's for all the individuals in a group were averaged, an index of group ability to re-create canonical sequence obtained ($\overline{P}_s$).

Table 1 presents $\overline{P}_s$'s and associated SD's by experimental group. Examination of Table 1 reveals that the $\overline{P}_s$'s were lower for the poor deaf reader group than for the other experimental groups for all three stories. One-way analyses of variance showed the differences between the experimental groups to be significant for all three stories (see Table 2). Tukey post hoc procedures ($p < .05$) showed significant differences between the

Table 1. $\bar{P}_s$ on Story Order by Group
for the Farmer, Boy, and King Stories

Group	Story					
	Farmer		Boy		King	
	P_s	SD	P_s	SD	P_s	SD
Poor Deaf Readers	.688	.133	.536	.229	.699	.241
Good Deaf Readers	.737	.116	.604	.190	.872	.131
Hearing Readers	.853	.156	.748	.190	.925	.076

Table 2. One-way Analysis of Variance Summaries on P_s for the Farmer, Boy, and King Stories

Story	d.f.	Sum of Square	Mean Square	F	P
Farmer	2	.248	.124	6.921	.0021
	54	.969	.018		
Boy	2	.404	.202	4.929	.0108
	54	2.213	.041		
King	2	.481	.241	9.251	.0004
	54	1.404	.026		

poor deaf and hearing groups and between the good deaf and hearing groups for the Farmer story. The Boy story differences were between the poor deaf and hearing group. The King story showed significant contrasts between the poor deaf and hearing groups and between the good deaf and hearing groups.

Story Cluster Comparisons

The Hierarchical Cluster Analysis (HCA) solutions for the three experimental groups were computed as detailed below.

First, the relatedness score was tallied for each proposition pair by counting the number of subjects that included the pair in a cluster for each story. Second, the resultant relatedness matrix was analyzed by Hierarchical Cluster Analysis (cf. Johnson, 1967; Friendly, 1977). The complete-link (diameter) method was employed to derive all cluster solutions.

Third, two statistics were used to evaluate the complete-link solutions. One statistic, Δ, evaluated how well the cluster solutions fit the input data. Δ values below .100 indicate good fits of cluster solution to input data. The second statistic, Z, evaluated whether the sentences in a cluster represented a true cluster or merely a random clustering of elements. The higher the value of $Z_{k,n}$ the better the probability that the sentences formed a true cluster and $Z_{k,n} \geq 4$ was considered significant. However, as $Z_{k,n} \geq 4$ is probably very conservative (Pollard-Gott et al., 1979) $3 \leq Z_{k,n} < 4$ were also reported.

Farmer Story. The Farmer story in original and edited form is shown in Table 3. The Mandler and Johnson (1977) tree structure is shown in Figure 1. The cluster solutions and Δ's for the poor deaf, good deaf, and hearing readers are displayed in Figure 2.

TABLE 3. FARMER STORY

Original	Edited
1. There was an old farmer.	1. There was an old farmer.
2. He owned a very stubborn donkey.	2. The farmer owned a very stubborn donkey.
3. One evening the farmer wanted to put his donkey into the barn.	3. The farmer wanted to put his donkey into the barn.
4. First he pushed him.	4. The farmer pushed the donkey.
5. The donkey would not move.	5. The donkey would not move.
6. Then he pulled him.	6. The farmer pulled the donkey.
7. The donkey still would not move.	7. The donkey still would not move.
8. Next the farmer thought he could frighten the donkey into the barn.	8. The farmer thought that he could frighten the donkey into the barn.
9. So he asked his dog to bark at the donkey.	9. The farmer asked his dog to bark at the donkey.
10. The lazy animal refused.	10. The lazy animal refused.
11. Then the farmer thought that his cat could get the dog to bark.	11. The farmer thought that his cat could get the dog to bark.
12. So he asked the cat to scratch the dog.	12. The farmer asked the cat to scratch the dog.
13. The cooperative cat scratched the dog.	13. The cooperative cat scratched the dog.
14. The dog immediately began to bark.	14. The dog immediately began to bark.
15. The barking frightened the donkey.	15. The barking frightened the donkey.
16. The donkey jumped into the barn.	16. The donkey jumped into the barn.

Figure 1. Theoretical story structures(Mandler & Johnson, 1977) for the Farmer, Boy, and King stories.

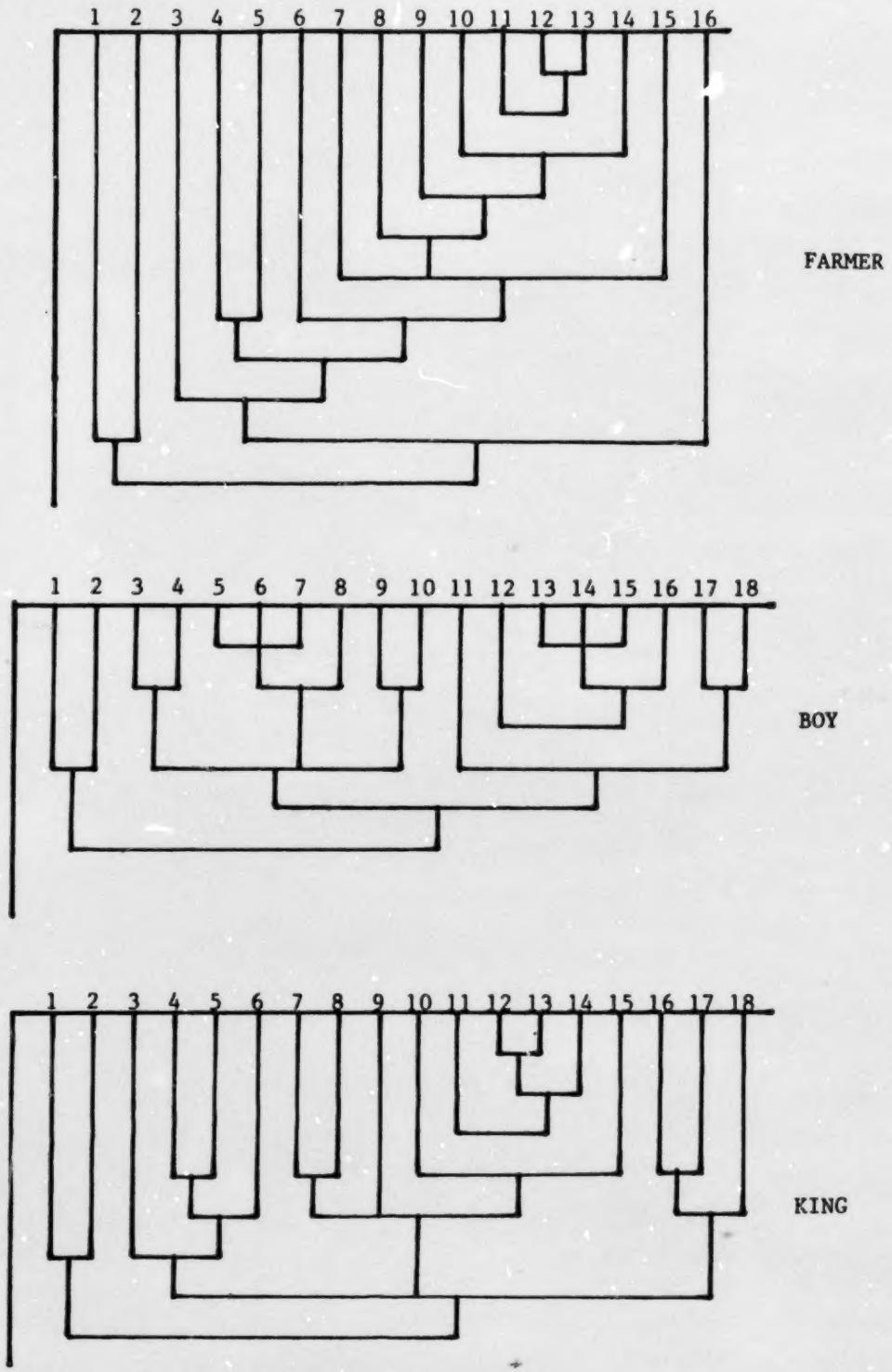
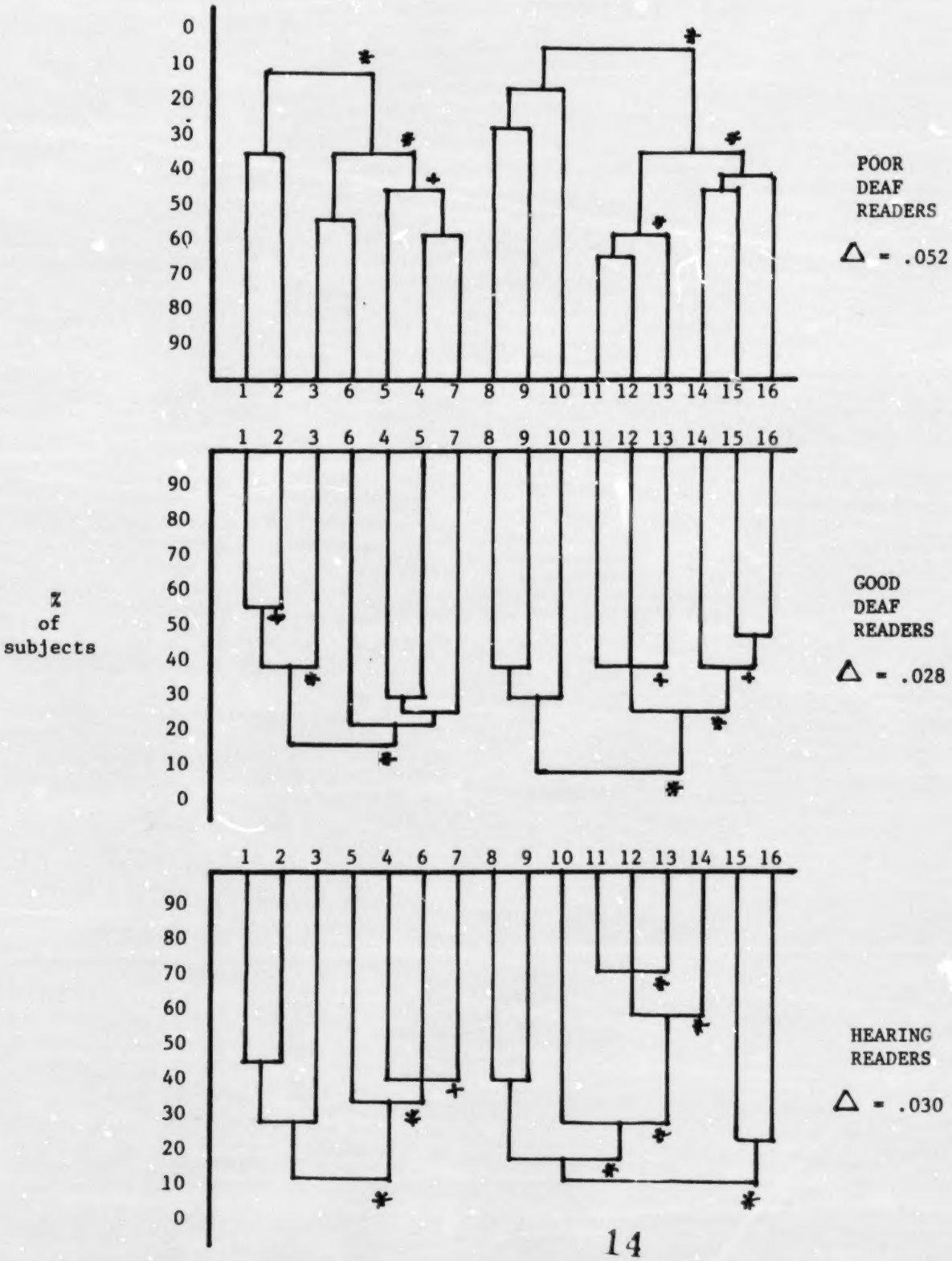


Figure 2. Cluster solutions for the Farmer story by group[2]



Mandler and Johnson's grammar produces a neat right-branching tree structure that shows considerable embedding of propositions within constituents (see Figure 1). However, as Pollard-Gott et al. (1979) pointed out, the subjective structures produced by hearing subjects parse the story into three basic episodes: sentences 1-7 describe the Setting and the farmer's initial failure to get the donkey into the barn, sentences 8-10 describe a second abortive attempt, and sentences 11-16 describe the final events culminating in the donkey entering the barn. The cluster solutions for the experimental groups were quite similar; particularly the solutions for the poor and good deaf readers. All three groups showed a Setting cluster and a major episode structure that indicated the groups share similar conceptions of story structure, at least at a gross constituent level.

Some inter-group differences in the boundaries and internal organization of the constituents were evident however. All three groups organized the Setting and first episode differently. Poor deaf readers structured the Setting (1, 2) and the first episode (3, 6, 5, 4, 7). The good readers, however, linked sentence 3 (The farmer wanted to put his donkey into the barn.) to the Setting cluster as did the hearing subjects. In the original story, the phrase, One evening, demarked the use of sentence 3 as the Beginning of the first episode (see Table 3). Apparently the good deaf and hearing readers were influenced by the removal of this marker. Sentence 4, 5, and 6 also showed the influence of the removed markers as all three groups structured the first episode differently.

The second (8-10) and third (11-16) episodes for the two deaf groups were very nearly identical. The hearing group, however, showed a structure in the final story episode that closely followed the Mandler and Johnson

(1977) theoretical structure for the story (see Figure 1). Interestingly, the two cluster solutions for deaf readers here were very similar to the cluster solutions shown for hearing subjects in previous experiments (Knight, 1982, 1983; Pollard-Gott et al., 1979). In those experiments, hearing subjects showed regular departures from theoretical structures. Here, however, the removal of grammatical constraints seems to have stimulated structures closer to a theoretical parsing of the story, for the hearing subjects.

Boy Story. The original Boy story and the edited version used in this study are listed in Table 4. The Mandler and Johnson (1977) tree diagram is shown in Figure 1. Figure 3 depicts the cluster solutions for the three experimental groups.

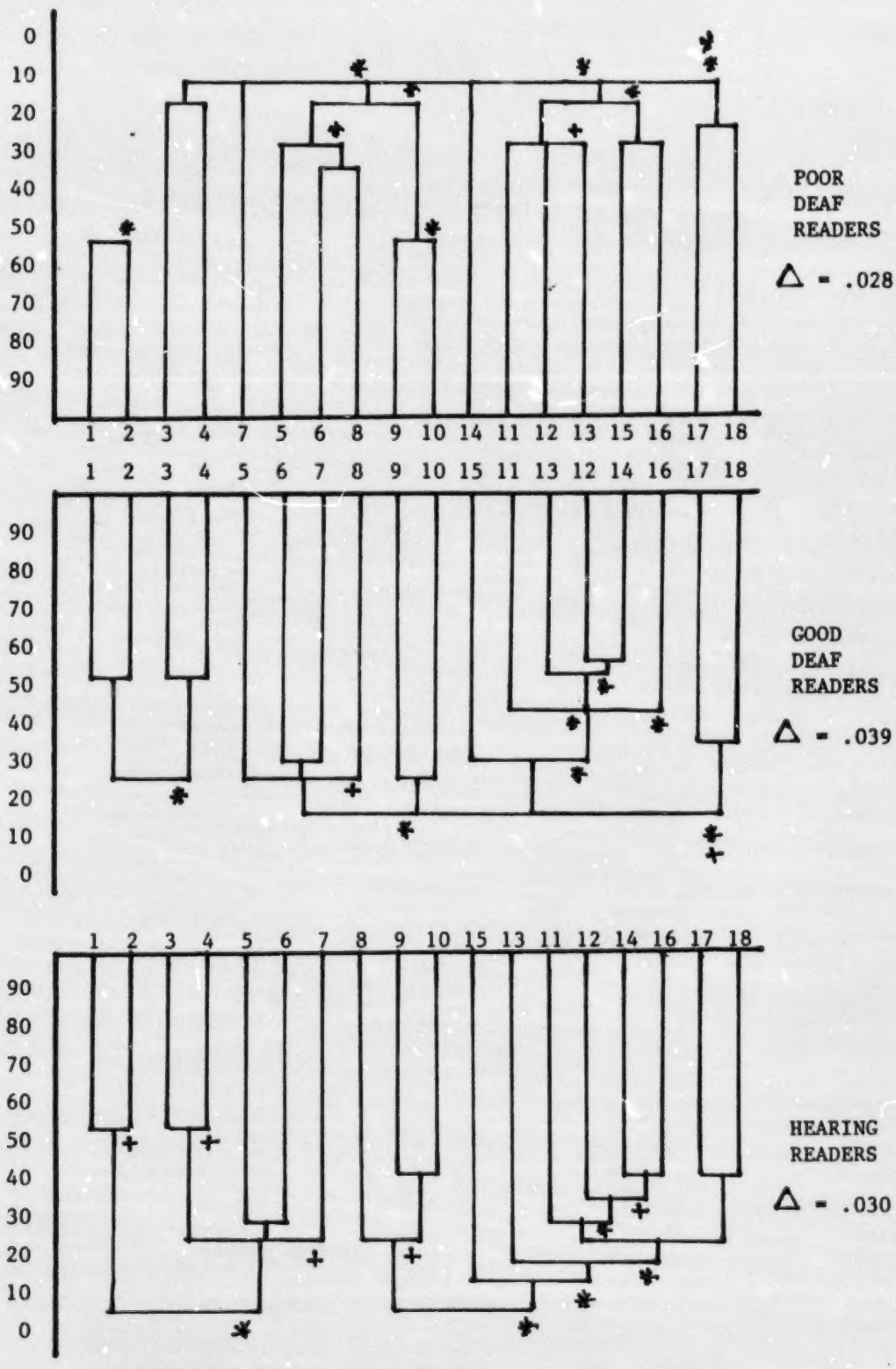
The Boy story presented the most difficulty for the experimental groups as evidenced by the relatively low $\overline{P}_s$ values from the story ordering comparisons. Some of these difficulties also appeared in the cluster solutions, particularly for the hearing group. According to Mandler and Johnson, the Boy story consists of two symmetrical episodes (3-10, 11-18) with a common setting statement (1-2). Hearing subjects, however, attached sentences 8, 9, and 10 to the second rather than to the first episode. Both groups of deaf readers kept the theoretical proposition membership intact for the two episodes.

Other differences were shown to exist between the solutions for the experimental groups. For example, the good deaf readers linked sentences 3, 4 with the Setting cluster (1, 2) while the poor deaf and hearing readers linked 3, 4 with the first episode. The only change between the edited sentences 3, 4 and the original 3, 4 was that the edited sentences

TABLE 4. BOY STORY

Original	Edited
1. There once was a little boy.	1. There was a little boy.
2. He lived in a very hot country.	2. The little boy lived in a very hot country.
3. One day his mother told him to take some cake to his grandmother who lived nearby.	3. The little boy's mother told him to take some cake to his grandmother who lived nearby.
4. She warned him to hold the cake very carefully so it would not break into crumbs.	4. The mother warned him to hold the cake very carefully so it would not break into crumbs.
5. The little boy wrapped the cake up in a leaf.	5. The little boy wrapped the cake up in a leaf.
6. He tucked the cake under his arm.	6. The little boy tucked the cake under his arm.
7. He carried the cake to his grandmother's house.	7. The little boy carried the cake to his grandmother's house.
8. When he got there the cake had all crumbled into pieces.	8. The cake had all crumbled into pieces.
9. His grandmother told him he was a silly little boy.	9. The little boy's grandmother told him he was a silly little boy.
10. She said that he should have carried the cake on top of his head so that it wouldn't break.	10. The grandmother said that he should have carried the cake on top of his head so that it wouldn't break.
11. She gave him a pat of butter to take back to his mother's house.	11. The grandmother gave him a pat of butter to take back to his mother's house.
12. The little boy wanted to be very careful with the butter.	12. The little boy wanted to be very careful with the butter.
13. He put the butter on his head.	13. The little boy put the butter on his head.
14. He carried the butter home.	14. The little boy carried the butter home.
15. The sun was hot.	15. The sun was hot.
16. When he got home the butter was all melted.	16. The butter was all melted.
17. His mother told him he was a silly little boy.	17. The little boy's mother told him he was a silly little boy.
18. She said that he should have wrapped the butter in a leaf so it would have gotten home safe and sound.	18. The mother said that he should have wrapped the butter in a leaf so it would have gotten home safe and sound.

Figure 3. Cluster solutions for the Boy story by group



had explicit references to the boy and mother, respectively, whereas the original sentences used pronominal reference (see Table 4). In fact, the explicit reference was the only difference between the edited and original sentences in the entire Boy story as the Boy story contained no markers cuing story segments other than the story content itself.

Additional variation between groups was found in the internal structuring of the episodes. For example, the final episode in the solutions for all three groups was organized differently. One alteration was that sentence 15 (The sun was hot) appeared to be used as Setting information (to initiate the final episode) in the solutions for the good deaf and hearing groups. The poor deaf group placed sentence 15 so as to explain why the butter was melted as occurred in the theoretical structure.

King Story. The King story in original and edited form is shown in Table 5. The Mandler and Johnson tree diagram is shown in Figure 1 and the cluster solutions for the experimental groups are presented in Figure 4.

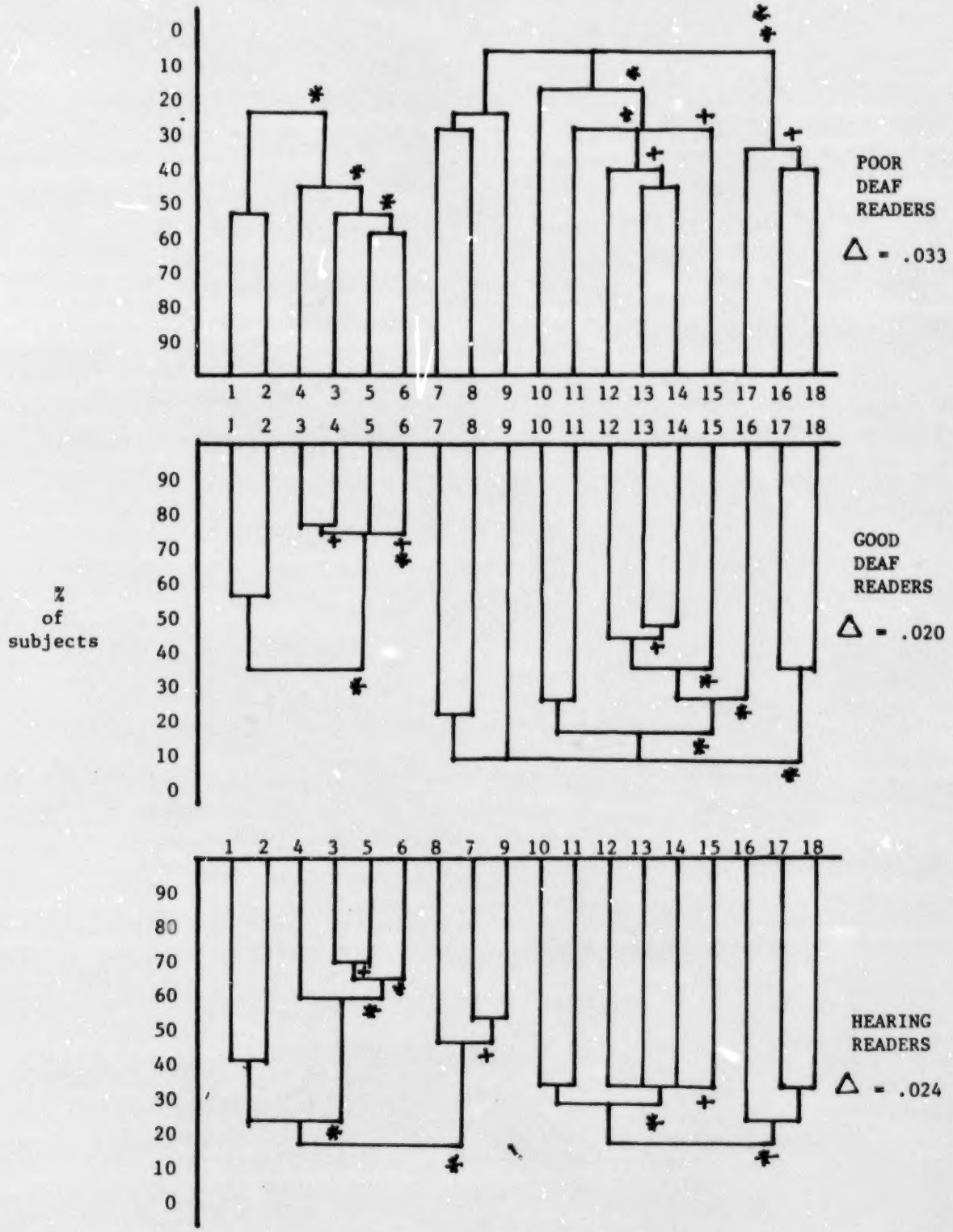
Mandler and Johnson segment the King story into a Setting (1-2) and three episodes. The first episode (3-6) details the daughters in the woods, the second episode (7-15) initiates the appearance of the dragon and ends with an embedded rescue sequence, and the third episode (16-18) includes the return of the maidens by the heroes and their subsequent reward.

All three groups produced subjective structures that were remarkably similar to the theoretical structure. Examination of Figure 4 shows that each solution represented a Setting and three episode structure. The hearing solution, however, linked the dragon appearance constituent (8, 7, 9) to the first rather than second episode. This represented the only departure of any significance for all three groups.

TABLE 5. KING STORY

Original	Edited
1. Once there was a king.	1. There was a king.
2. The king had three lovely daughters.	2. The king had three lovely daughters.
3. One day the three daughters went walking in the woods.	3. The three daughters went walking in the woods.
4. They were enjoying themselves very much.	4. The three daughters were enjoying themselves very much.
5. They lost track of the time.	5. The three daughters lost track of the time.
6. They stayed too long in the woods.	6. The three daughters stayed too long in the woods.
7. A dragon appeared.	7. A dragon appeared.
8. He kidnapped the three daughters.	8. The dragon kidnapped the three daughters.
9. As they were being dragged off they cried for help.	9. The three daughters cried for help.
10. Three heroes heard their cries.	10. Three heroes heard their cries.
11. They set off to rescue the daughters.	11. The three heroes set off to rescue the daughters.
12. The heroes reached the scene.	12. The heroes reached the scene.
13. They fought the dragon.	13. The heroes fought the dragon.
14. They killed the dragon.	14. The heroes killed the dragon.
15. They rescued the maidens.	15. The heroes rescued the maidens.
16. The heroes returned the daughters safely to the palace.	16. The heroes returned the daughters safely to the palace.
17. The king heard of the rescue.	17. The king heard of the rescue.
18. He rewarded the heroes.	18. The king rewarded the heroes.

Figure 4. Cluster solutions for the King story by group



The results from the story order comparisons showed $\bar{P}_s$ to be highest in each group for the King story. In addition, Knight (1983) found that deaf and hearing subjects displayed the same recognition behavior for the King story content. These findings indicate that deaf and hearing subjects view the King story in a more similar fashion than they do the Farmer and Boy stories.

Discussion

Although the results showed some interesting differences between the experimental groups, these differences did not follow a similar pattern across the three stories. Consequently, a closer examination of the stories in both their original and edited forms is appropriate (see Tables 3, 4, 5). The Farmer story represents the most embedded theoretical structure of the three stories. It also contains the most salient examples of syntactic markers cuing these embedded structures. For example, the use of then and next to indicate embedded sequences was most prevalent in the Farmer story. The Boy and King stories did not contain these types of cohesive features to the same extent. In fact, the differences between the edited and original versions of the Boy story were solely in terms of explicit vs. anaphorical reference. This was also largely true of the King story although the original sentence 3 contained the phrase one evening that marked the Beginning of the first episode. In addition, the anaphorical reference in the original King story was maintained over a shorter sentence span than in the Boy story. That is, the King story did not extend anaphorical reference for more than three adjacent sentences whereas the Boy story extended the anaphorical reference for the little boy over a six sentence span in the first episode and seven in the second episode.

Given all of these considerations, however, the Farmer story analysis should represent the clearest example of grammatical influence on subjective structure. Indeed, the story order information indicated that there were significant differences in subjects ability to reconstruct canonical sequence between the hearing and poor deaf readers and hearing and good deaf readers. In addition, differences were noted in subjective structures that could easily be attributed to the lack of markers in the edited story propositions. Notably, the linking of sentence 3 to the Setting (for hearing and good deaf readers) placement as the Beginning of the first episode and the variance in placement of sentences 4 and 6 within the first episode were obviously tied to the lack of markers cuing canonical placement.

However, several examples where differences could have surfaced but did not can also be provided. Sentences 8 and 9 and sentences 11 and 12 contained markers cuing sentential dependencies in the original version that were removed in the edited versions. However, these sentences were linked in very similar fashion across the three groups of readers indicating a lack of grammatical influence. Consequently, the Farmer story, results at this level of analysis, contain examples that both suggest a clear grammatical constraint on subjective structure and examples that do not demonstrate this relationship.

At a broader level of analysis, the Farmer story results here present some provocative comparisons with previous studies involving subjective story sturcture of deaf and hearing readers. One example is that regarding the placement of sentence 10 (The lazy animal refused) in the Farmer story.

Previous studies (Knight, 1982, 1983) have shown that deaf readers consistently assign sentence 10 to the Ending of the first episode. This assignment dictates that the lazy animal refers to the donkey rather than the dog (as in the theoretical structure). Here, however, both groups of deaf readers placed sentence 10 as the Ending of the second episode so that it refers to the dog. In addition, deaf subjects in those previous studies showed altered assignment of sentences 8 and 9 compared with hearing subjects and with the theoretical structure. Again, these assignment differences did not appear here when deaf subjects were manipulating the edited story propositions. The deaf readers in this study actually produced structures similar to those of hearing subjects in the previous studies. The hearing readers here, on the other hand, produced subjective structures closer to the theoretical story organization than had hearing subjects in the previous experiments. Obviously, grammatical indicants of story segmentation influenced readers' subjective organization of the Farmer story.

The Boy story results are not as clear regarding the influence of grammatical constraints on narrative structure. Although differences were noted among the solutions to the Boy story, these variations were not obviously attributable to the edited propositions. This lack of pattern may be partly explained by the relatively minor use of markers in the original Boy story. As noted above, the Boy story did not use formal indicants demarking constituent boundaries and the major difference between the edited and original stories was the explicitness of reference. The original story contained a high degree of anaphorical reference. Although anaphorical reference places some constraints on sentential relationships

(e.g. the explicit reference must preceed the anaphorical reference) it does not dictate story segmentation to the same degree as more formal indicants (e.g. Then, So, Next). Thus, the reader must have relatively sophisticated knowledge of reference to fully exploit this information. If deaf readers are relatively insensitive to grammatical subtleties, the removal of the anaphorical reference in favor of the explicit reference, as occurred in the edited story sentences, would not likely provoke significant shifts in deaf readers' subjective organization of the narrative. The hearing readers, who may rely more heavily on the anaphorical reference to cue structural facets, would be more influenced by the omission of the anaphorical referencing. As the hearing subjects showed the greatest departure from canonical structure, this possibility cannot be immediately discounted.

The manipulation of the edited propositions did produce problems for all three groups of readers in reconstructing canonical story sequence. The $\overline{P}_S$ values for all three groups were lowest for the Boy story. The only post hoc comparison achieving significance was between the hearing and poor deaf readers. The two subgroups of deaf readers did not differ to a significant degree and this finding, in concert with the relatively large structural departures shown for hearing readers, supports the contention that deaf subjects were relatively insensitive to the grammatical influences inherent in the Boy story.

When compared with previous findings, however, some interesting factors come to light in this regard. For instance, the deaf readers in previous experiments (Knight, 1982, 1983) had consistently assigned sentence 5 (The little boy wrapped the cake up in a leaf) so that it represented a

reaction to the cake crumbling all to pieces rather than representing a misguided attempt to prevent the cake from crumbling (as in the theoretical and hearing reader versions). Here, however, both groups of deaf readers assigned sentence 5 consistent with the theoretical interpretation. As in the Farmer story, it appears that the edited stories prompted a shift toward hearing-like story interpretations among both groups of deaf readers.

The King story results showed the least structural differences between the group of readers. Aside from the shift of the diagram appearance segment (8, 7, 9) from the second to the first episode in the hearing solution, the cluster results were remarkably similar. Although a previous experiment (Knight, 1982) had reported that deaf subjects assigned sentences 10 and 11 to create a non-embedded rescue sequence in the second episode, a canonical sequencing of the second episode was displayed here. This instance provides a third example of a shift to hearing-like story interpretations for deaf subjects when clustering the edited story propositions.

This shift, presumably due to the lack of grammatical indicants of story structure, provides for some interesting speculation. Typically, deaf subjects are thought to lack certain knowledge regarding various facets of English syntax and grammar. This lack, in turn, results in non-comprehension of information presented in English. Here, however, the evidence suggests that the grammatical features may actively foster <u>different</u> comprehension of narrative information. When these features were present deaf readers produced subjective structures that were different from those produced by hearing readers. When these features were removed, the deaf

subjects produced subjective structures very similar to those produced by the hearing readers (in previous experiments). Hearing subjects in the present study, on the other hand, produced subjective structures that were different from those for hearing subjects in the previous experiments. Both deaf and hearing readers, then, were influenced by the removal of the grammatical constraints but with quite different end results. This hypotheis cannot account for all structural aspects, however, as several instances were noted where grammatical features could have influenced readers' subjective structure but did not do so.

Although differences were shown between the poor and good deaf readers' subjective structures, these differences were minor and represented virtually identical notions of story structures. The results regarding story order for the Farmer and Boy story supported this interpretation as there were not significant differnces in $\overline{P}_S$ between good and poor deaf readers. Interestingly, the $\overline{P}_S$ values for the King story showed a significant mean difference between the two groups of deaf readers. This is surprising in view of the high similarity in subjective structures of the two groups of deaf readers for the King story. This could indicate that the relationship between story order and story structure is not as direct as theory would dictate. The fact that the poor deaf readers exhibited the lowest $\overline{P}_S$ for each story but produced subjective structures very similar to the good deaf readers would also bring this relationship between story order and story structure into question.

Finally, some considerations regarding the narratives used in this study need to be made. These narratives represent relatively simple literary structures that do not place a heavy load on the reader, in terms

of comprehension and memory. Although only minor structural differences between good and poor deaf readers were found here a more difficult reading task could conceivably exaccerbate these minor differences into more significant factors.

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Footnotes

[1]Reading scores were obtained on all subjects. Unfortunately, the scores for deaf upperclassmen were incomparble with those available for the deaf prep students due to a recent renovation of the Gallaudet admissions procedures. Consequently, the reading scores were of little value in determining good and poor deaf readers necessitating a categorical assignment procedure. As the Gallaudet prep students have a history of depressed reading achievement compared with the college population the group assignment is estimated to be valid.

[2]The figures represenitng HCA solutions are interpreted in the following manner. The vertical axis represents % of subjects and the horizontal axis represents sentence number (see Figure 2). Thus, sentences 1 and 2 were paired by at least 35% of the poor deaf readers, 4 and 7 by at least 59% of the poor deaf readers, and so on. An "*" placed above a cluster indicates $Z \geq 4.0$ and a "+" indicates $3.0 \leq Z < 3.99$.